

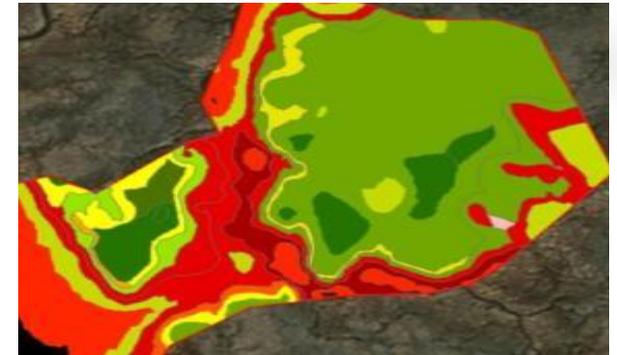
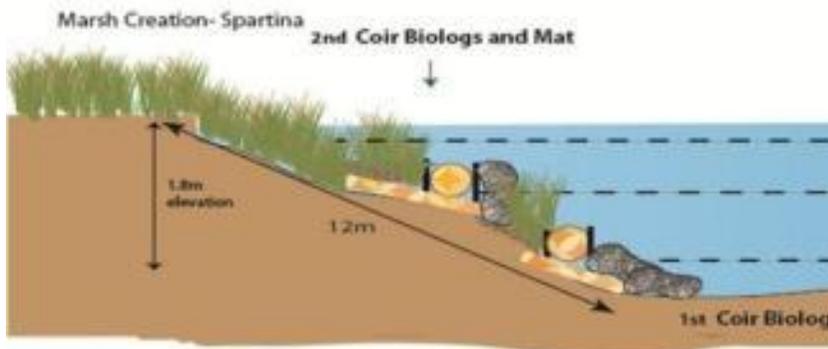
# DE Living Shorelines Committee Overview & Products



**Danielle Kreeger**

Partnership for the Delaware Estuary

NJDEP Living Shoreline Restoration Summit  
Feb 27, 2015



# The Delaware Estuary Living Shoreline Initiative

Since 2007:

**Regional Planning**

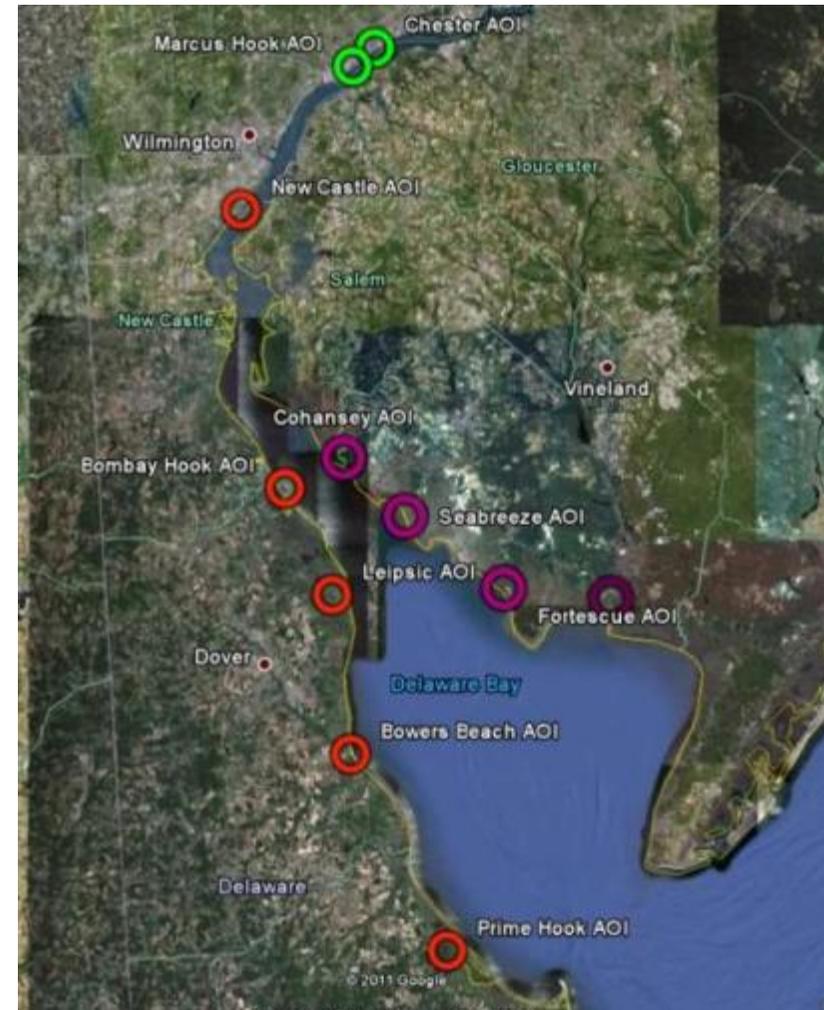
**Tactics R&D**

**Demo Projects**

**Monitoring**

**Coordination**

**Outreach**



# The Delaware Estuary Living Shoreline Initiative

## Tactics R&D



**COIR Log/Mussel/Plant Tactic**



# The Delaware Estuary Living Shoreline Initiative

Since 2007:

Regional Planning

Tactics R&D

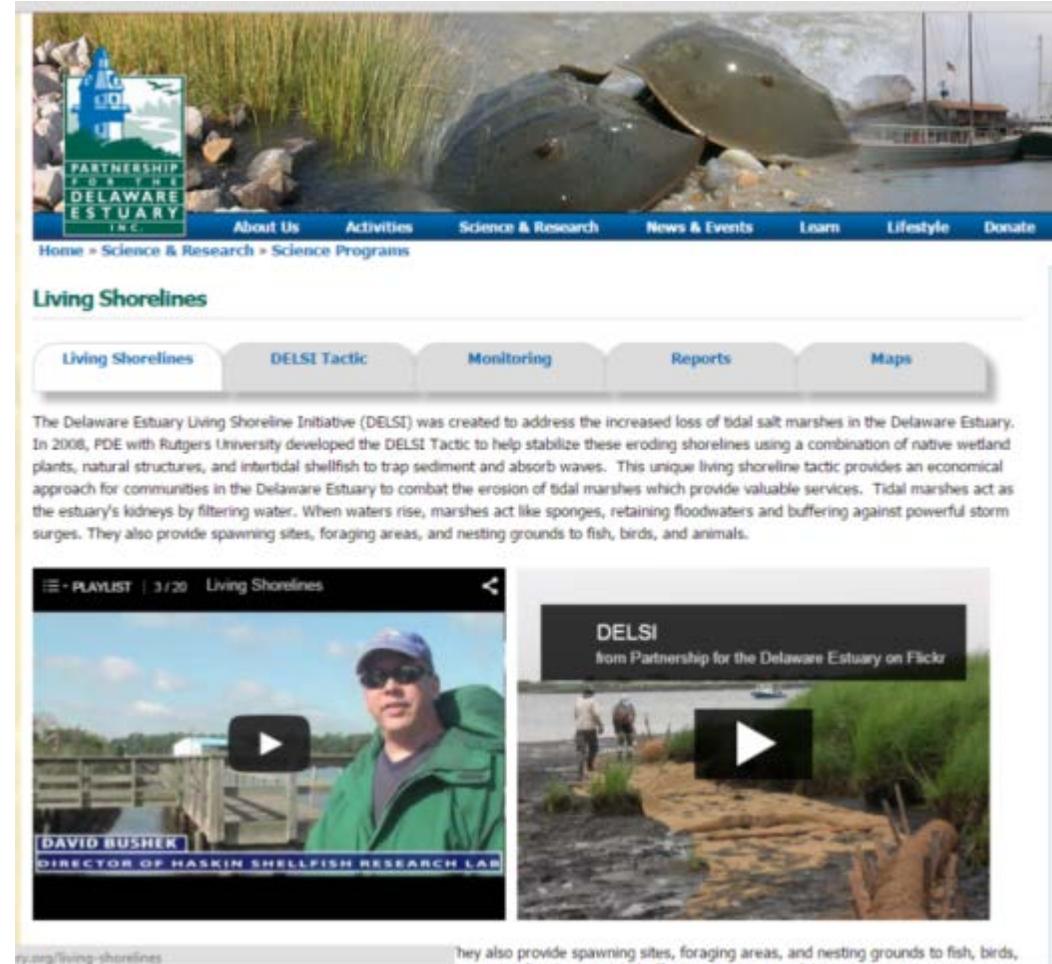
Demo Projects

Monitoring

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Outreach

<http://www.delawareestuary.org/living-shorelines>



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## Living Shorelines

Living Shorelines DELSI Tactic Monitoring Reports Maps

The Delaware Estuary Living Shoreline Initiative (DELSI) was created to address the increased loss of tidal salt marshes in the Delaware Estuary. In 2008, PDE with Rutgers University developed the DELSI Tactic to help stabilize these eroding shorelines using a combination of native wetland plants, natural structures, and intertidal shellfish to trap sediment and absorb waves. This unique living shoreline tactic provides an economical approach for communities in the Delaware Estuary to combat the erosion of tidal marshes which provide valuable services. Tidal marshes act as the estuary's kidneys by filtering water. When waters rise, marshes act like sponges, retaining floodwaters and buffering against powerful storm surges. They also provide spawning sites, foraging areas, and nesting grounds to fish, birds, and animals.

PLAYLIST | 3 / 20 Living Shorelines

DAVID BUSHEK  
DIRECTOR OF HASKIN SHELLFISH RESEARCH LAB

DELSI  
from Partnership for the Delaware Estuary on Flickr

ry.org/living-shorelines they also provide spawning sites, foraging areas, and nesting grounds to fish, birds,

# The Delaware Estuary Living Shoreline Initiative

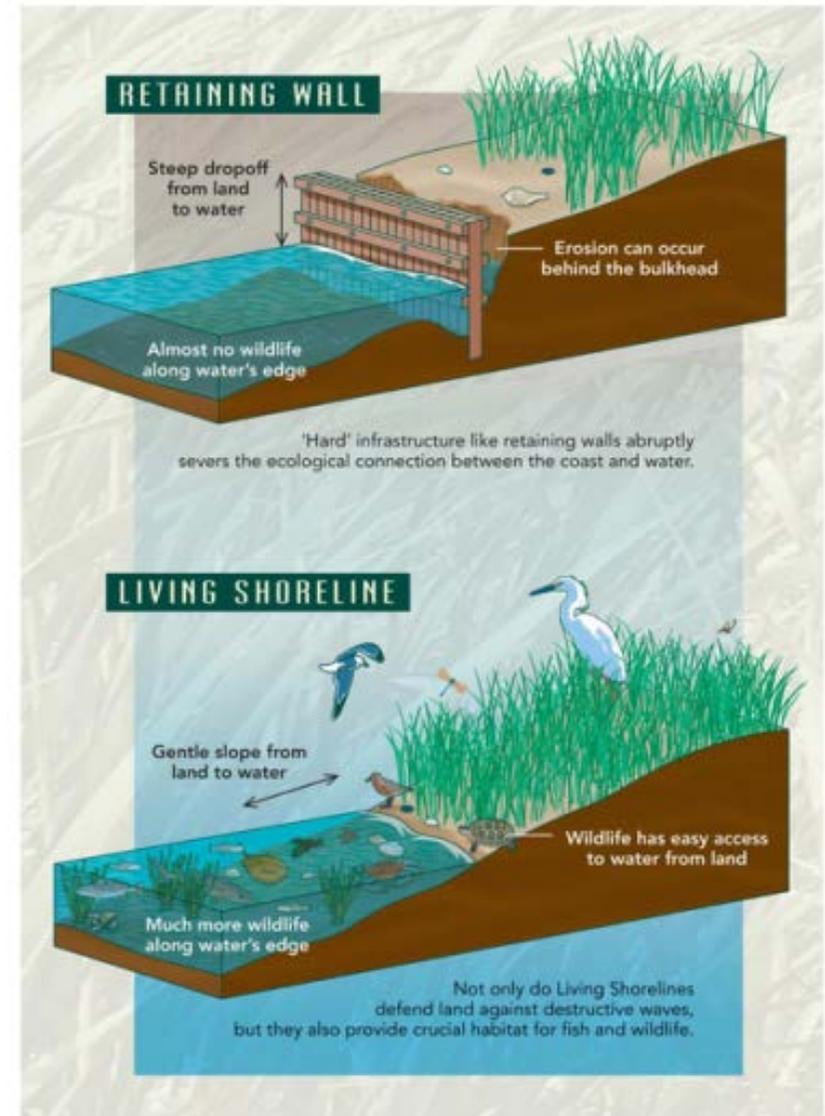
## LS Workshops

- Dover 2011, 2014
- Vineland 2011
- Camden 2011, 2012
- Cape May 2015

## Practitioner's Guide

## Brochures

## Contractor Training



# State of Delaware Living Shoreline Committee

**Formation:** July 30, 2013

**Initiated by:** DNREC, PDE, CIB

**Meetings:** 6 since formation

**Membership (open):** 44 participants

**Sectors:** federal, state, local governments  
academia, NEPs, non-profits, companies  
(incl/ DNREC, DeIDOT, DNERR, DCMP)

**Co-Chairs:** Alison Rogerson, Danielle Kreeger

# State of Delaware Living Shoreline Committee

## Subcommittees:

- **Education & Outreach** - Sally Boswell
- **Standards of Practice** – Josh Moody, Andy Howard
- **Regulations & Policy** – Bart Wilson
- **Implementation** - Danielle Kreeger

# DLSC - Education & Outreach Subcommittee

## Goals and Outcomes

- Centralized website
- Outreach material for different audiences (e.g. landowners, contractors, etc.)
- Marine Contractor Training

## Additional Actions to Achieve Goals

- Standard Messaging
- Resource Sharing
- Coordination of Outreach events

## Products

- Definitions (public, technical)
- Contractor Training (Feb 2015)
- Signage at Demo Sites

Open House (2014)  
Storymap

Register now for a free  
**LIVING SHORELINE TRAINING  
WORKSHOP**  
For contractors and environmental consultants

**Our Instructors**

**Gene Slear** is the Senior Vice President of Environmental Concern in St. Michaels, MD. He brings over 40 years of experience providing wetland services training professionals and demonstrating restoration techniques.

**Jim Chaomas** is an Environmental Scientist with DNREC working with coastal permitting and wetland project planning.

**Space is limited! Registration is required.**

**Please contact:** Alison Rogerson at 302-739-9939 or [alison.rogerson@state.de.us](mailto:alison.rogerson@state.de.us)

**February 25th & 26th**  
9:00-4:00  
DNREC Lewis Facility  
901 Pilottown Rd.  
Lewes, DE 19958  
302-835-3290

Lunch will be provided

Attendees who complete both days will receive a \$100 stipend!

Topics to be covered include:

- The added benefits that landowners are looking for
- How to reduce state and federal permit costs and handling time
- Calculating installation costs
- How to design and construct a living shoreline project
- Building a maintenance package with your clients

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# DLSC – Standards of Practice Subcommittee

## Goals and Outcomes

- Define Terminology
- Monitoring Framework
- Practitioner's Guides

## Additional Actions to Achieve Goals

- Cost Comparisons (initial vs. maintenance)

## Products

- Draft LS Monitoring Framework for DE
- Two LS Monitoring Workshops (USFWS, Summit)





# Monitoring Protocols to Gauge Living Shoreline Outcomes

Danielle Kreeger and Joshua Moody

Partnership for the Delaware Estuary, One Riverwalk Plaza, Suite 202, Wilmington, DE 19801

## Abstract

Coastal wetlands and some other habitats are increasingly degraded, eroding, and drowning in the Delaware Estuary and vicinity. In response, many types of projects are being proposed or implemented to help stem these losses and protect coastal resources, such as living shorelines, thin-layer sediment application, and hydrologic improvements. Despite growing interest in living shorelines and other tactics within the Delaware Estuary as a result of Hurricane Sandy, few projects have been locally installed and there are insufficient scientific studies concerning their performance and long-term viability. It is therefore important that outcomes from new projects are assessed in a standardized manner and that resulting data are interoperable and sharable.

To address this assessment gap, a draft monitoring framework was developed by PDE and shared in April 2014. With help from local and regional partners, this framework is now being adopted to serve the diverse needs of agencies, academics, non-profits, and the public. The framework recognizes that different users and project implementers may have vastly different goals, capacity and resources. Hence, recommended metrics and methods depend on these additional considerations. Metrics are parameters used to assess changes in key site features (e.g., physical, biological conditions), whereas methods are the techniques used to collect data per metric. In addition to helping select appropriate measures and methods, the framework provides recommendations for crafting a monitoring plan. The goal of the monitoring framework is to help assess and share understandable outcomes among the restoration community so that the design of future projects can continue to be improved based on past successes and lessons learned.

## Step 1. Identify Goals and Users



**Goal** Monitoring should be tailored to assess whether a project achieves its goals. Although many coastal resilience projects aim to stabilize erosion while enhancing environmental conditions, there may be other important objectives. Five example goals are shown in the green column in Table 1.

**User** Different users groups may have disparate interests, expertise, and resources. Although standardization is to be encouraged, the actual selection of metrics and methods may vary widely. Four example user groups are shown in the orange row in Table 1.

Table 1. A two-factor matrix showing twenty different User/Goal combinations.

	Regulatory Agency	Science Group	Contractors	Public
Erosion Control	A1	A2	A3	A4

## Step 3. Choose Methods

Before selecting methods to assess the chosen metrics, it is important to recognize any constraints or special circumstances that may guide choices. These additional considerations are briefly listed below.

- Technical expertise.** Some methods require special training.
- Budget/Resources.** Methods vary widely in cost, and some require special equipment.
- Time Constraints.** Grant periods or other conditions may require expedited monitoring or otherwise limit the use of some methods and approaches.
- Permitting.** Some monitoring methods may require special permits different from construction permits.
- Scale.** Some methods are more suitable for larger or smaller scales of time and space.
- Analysis.** The ideal design of monitoring plans (statistics, replication) may be constrained. For example, in cases where a comparative control is sought, one may not exist.

For each metric, the framework will rank the various methods options as relatively low, medium or high per consideration. For example, cost is usually an important consideration, and so methods will be compared for their expense.

## Definitions

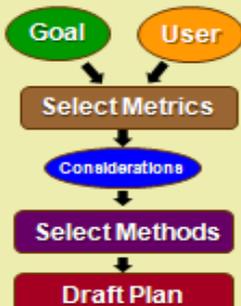
The term "Living Shoreline" represents a number of treatments and techniques that:

- offer resilience to shorelines from wave, surge, tidal, or boat wake energies and/or rises in sea level;
- utilizes predominantly natural materials and/or processes exclusively or in combination with structural components;
- sustains, enhances, and/or restores ecological functions and connections between upland and aquatic areas.

The focus of this monitoring framework is living shoreline projects, but it can be adapted for other types of coastal resilience and enhancement projects such as thin-layer sediment application and hydrologic restoration.

## Approach

There is a broad spectrum of monitoring options. Decisions regarding which metrics and methods to implement are selected based on goals, user sector, and additional considerations. The following model represents the step-wise procedure recommended for developing a suitable monitoring plan. The following sections describe each step.



## Step 2. Select Appropriate Metrics

**Metrics** Metrics are specific parameters used to assess general features whereas methods are the actual techniques that are used to assess the metrics.

Once fully developed, the framework will recommend one or more metrics for each User/Goal pairing (from Table 1). Some metrics may be suggested for most or all users per goal, and some metrics may be suggested for most or all goals per user group.

Tables 2-4. Preliminary list of example metrics (column 1), grouped by major attribute: physical/biological in Table 2, biological/ecological in Table 3, and economic in Table 4. Group/user code recommendations have yet to be determined (TBD in column 2). Example methods options are shown in column 3.

Attribute	Code	Example Metrics	Example Methods
Physical/Biological	A1	Wave Height	Wave gauge
		Wave Period	Wave gauge
		Wave Direction	Wave gauge
		Wave Energy	Wave gauge
Biological/Ecological	B1	Vegetation Cover	Aerial photography
		Species Diversity	Field surveys
		Soil Moisture	Soil moisture sensors
		Water Quality	Water quality sensors
Economic	C1	Property Value	Assessor data
		Construction Cost	Project records
		Operational Cost	Project records
		Benefit Cost Ratio	Project records

Tables 2-4 are still in development. Once these are completed, the next step will be to choose the methods from Column 3 that are most suited for your project (see Step 3).

## Step 4. Prepare Monitoring Plan

The monitoring plan should identify the appropriate endpoints, or success criteria, that will allow the user to assess outcomes of the project. For example, are there thresholds that need to be met?

Consider how the selected metrics and methods need to be applied to gauge the endpoints. If the study is scientific or subject to the need for proof (e.g. mitigation), what are the statistical requirements?

### Draft Plan

Monitoring plans will obviously vary widely, depending on the goals and users. At a minimum, they should identify the goals, users, and endpoints for the project or program. They should summarize the metrics and methods, and discuss any additional considerations, such as timeline.

In cases where proof of performance is needed, or in comparative scientific studies, it is important to adopt an accepted statistical approach such as a Before-After-Control-Impact (BACI) design (see below). Where constrained, the BACI approach can be modified (B vs. A, or I vs. C). It can also be strengthened by comparing outcomes to reference stations (BACIR).

In addition to the statistical design (where appropriate), monitoring plans should describe the frequency, duration, and seasonality, of any sample collection. They should describe any plot layouts, replication, and cite or otherwise describe appropriate methods.



## State Efforts

- Delaware.** The State of Delaware Living Shoreline Committee was formed in 2013. The Standards and Monitoring Subcommittee is working on a monitoring framework, which should be completed and ready for testing by the end of this year. To date, this framework aims specifically at living shoreline projects.
- New Jersey.** The Partnership for the Delaware Estuary is working with the Nature Conservancy and New Jersey Department of Environmental Protection to outline a monitoring framework that can be applied to all coastal resilience projects. A statewide Living Shoreline Committee is also planned.
- Pennsylvania.** No living shoreline projects or monitoring frameworks have been advanced as yet.



## Next Steps

- Special Panel Session, Wed. 9:00-10:30, Crystal Ball Room
- Further development of monitoring frameworks per state
- Methods repository to promote consistency
- Identification/funding for pilot projects to test frameworks
- Derivation of frameworks may be needed for specific purposes (e.g. regulatory, citizen science)
- Iterative sharing of data and outcomes, project registry
- Adaptive management of frameworks as technology and understanding evolves

## Acknowledgements

Support for the work has come from the Environmental Protection Agency via the National Estuary Program. Many individuals are contributing input on parallel, state-specific versions of monitoring frameworks. Specifically, we thank the following partners for their many intellectual contributions.

- Delaware:** Doug Jeter, Seawall Consulting; Greg D'Amico, DWRAC; Steve Rogers, DWRAC; Ben Esch, Nature Conservancy; Ben Wynn, USACE
- New Jersey:** Danielle Campbell, USACE; Ursula Schmitt, Nature Conservancy; Jeff Hinkle, USACE; Steve Kelleher, Nature Conservancy; Yvonne Scalet, State Senate; Ben P.

**Summit Proceedings:**  
<http://www.delawareestuary.org/Summit>

# DLSC – Regulations & Policy Subcommittee

## Goals and Outcomes

- Assess and work to revise regulations to promote greener methods
- Develop additional incentives for landowners (e.g. tax breaks)

## Additional Actions to Achieve Goals

- Statewide SAA review, revision
- Cost-Share Programs, Alternative Funding

## Products

- **Cost-Share** – up to 50% or \$5,000 back to homeowners
- **Permitting** – some projects still need an IP, looking at that
- **Updated SAA for DE** – but still some issues to resolve



# DLSC – Implementation Subcommittee

## Goals and Outcomes

- Facilitate demo projects for learning, outreach and training
- LS Project Registry - GIS database of project sites and metadata

## Products

- 3 New Demo Sites Installed in 2014 (Phase 1)
- Proposals for Additional Demo Projects (including larger ones)
- Project Registry – Excel Database



# Lessons for New Jersey

## Be Inclusive, Collaborate

“It takes a Village”

## Sync with Efforts Underway, e.g.,

TNC Coastal Resilience Tool, Measures & Monitoring Group

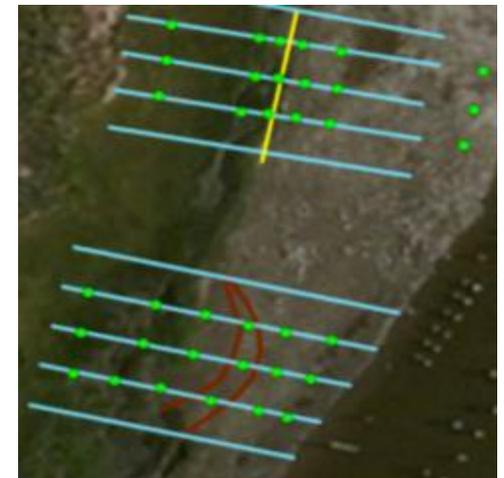
NEP Contractor Training, Workshops

## Base Decisions, Outreach on Science

Recognize Knowledge Gaps and Help Address

Support Smart Designs and Monitoring

Share Data, Link to Reference Datasets



# Monitoring Standards for Tidal Wetland Enhancement Projects

## Panel:

Bart Wilson, USFWS, Prime Hook NWR, Fed

Danielle Donkersloot, NJDEP, State

Alison Rogerson, DNREC, State

Danielle Kreeger, PDE, NEP

Doug Janiec, Sovereign Consulting, Private

Moses Katkowski, TNC, Non-Profit

Capt. Al Modjeski, ALS, Non-Profit



for more Info:

<http://www.delawareestuary.org/living-shorelines>



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